Jos Lesley

A DESCRIPTION

OF THE

RECENTLY DISCOVERED

PETROLEUM REGION

IN

CALIFORNIA,

WITH A REPORT ON THE SAME

BY

PROFESSOR SILLIMAN.

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Mr. J. P. Lesley,
Philadelphia, 13 June, 18

STATEMENT.

PETROLEUM IN CALIFORNIA.

The occurrence of fluid inflammable substances upon the coast of Santa Barbara, in Southern California, has been known since 1792; but little importance has been attached to it until very recently, when the development of the oil region of Pennsylvania has shown the immense value of the great natural repositories of petroleum, and directed attention to other localities in which it is found. One of the most extraordinary of these repositories is that secured by this Company near the coast of California, about 320 miles south from San Francisco, where the usual indications of petroleum were so great that parties on learning the fact at once proceeded to make explorations.

The importance of these indications of a great petroleum region was not appreciated by the early explorers and settlers in California from the Atlantic States; and none suspected that the oil of this district was destined to add another product to the resources of the State, unequaled perhaps in value even by that of her wonderful mines of the precious metals.* Even the indications of the vast quantities of petroleum on the surface, have been regarded by the owners of the estates, as a detriment to their property, inasmuch as they caused a loss of their live stock, in which the value of their ranches chiefly consisted, by the animals becoming drowned in the great pools of petroleum. And, as will be seen by reference to the report of Prof. Silliman, these exudations have the effect to render barren, tracts of land of a mile square, more or less, in the midst of a fine agricultural district.

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* The product of the oil wells west of the Alleghanies has amounted in value the last year to more than $25,000,000, while that of the California mines for the year 1863, according to the *San Francisco Mercantile Gazette*, amounted to about $44,000,000.

The first attempt to apply this petroleum to useful purposes was made about two years since by Mr. Gilbert, who, understanding its nature and finding it in abundance issuing from many springs upon the property now secured to this Company, put up for himself a refinery upon a small scale. He drew the crude oil chiefly from one of the great wells, from which he obtained 400 bbls. without apparently diminishing the supply. In the summer of 1864, Professor Silliman examined this locality, and in a letter, dated at Buenaventura, Santa Barbara County, July 2d, 1864, he thus communicates the results of his observations upon the Ojai ranch, the purchase of which he strongly recommended to his friends in New York.

"The property covers an area of 18,000 (eighteen thousand) acres in one body, on which are at present at least twenty natural oil-wells, some of them of the largest size. The oil is struggling to the surface at every available point, and is running away down the rivers for miles and miles. Artesian wells will be fruitful along a double line of thirteen miles, say, for at least twenty-five miles in linear extent. The ranch is an old Spanish grant, of four leagues of land,* lately confirmed, and of perfect title. It has, as I said, about eighteen thousand acres in it of the finest land, watered by four rivers, and measuring in a right line, in all near thirteen miles. As a ranch, it is a splendid estate, *but its value is its almost fabulous wealth in the best of oil*."

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* It is claimed that this ranch is included between certain natural boundaries, as rivers on the east and west, and ranges of mountains on the north and south; and should this claim be established, the extent of the property will probably reach full *eleven* leagues, or about 48,000 acres. The title to four leagues, which include the most valuable portion of the oil lands on this ranch, has been confirmed by the United States Court.

The report of Prof. Silliman, herewith appended, fully confirms his first impressions, and presents more complete details of the wonderful resources of this property. According to his advice and that of other competent judges in California, arrangements were made to purchase the estate by parties in New York in October, 1864. But before effecting this, it was deemed expedient to obtain from Professor Silliman a decided statement, that the oil was in his opinion fully equal to that of Oil Creek, Pennsylvania; and from able counsel in San Francisco, a professional opinion as to the validity of the title. Instructions were accordingly sent to close the purchase provided the oil was pronounced by Prof. Silliman equal to the best Pennsylvania oil, and the title perfect. Prof. Silliman telegraphed confirming his letter above quoted, and the title being pronounced by counsel undoubted, the property was purchased and is now vested in trustees: Charles H. Russell and Henry M. Alexander, Esqs., of New York, and will be conveyed by them to the Corporation.

The property owned by this Company is described by Prof. Silliman in his report, so that it will be necessary to call attention to a few only of its features. It is an estate lying in a valley between two ranges of mountains, distant from 7 to 20 miles from the coast, easily accessible by good natural roads, which pass up through gaps into the valley. Its surface is varied, with open spaces and groves of trees, chiefly oak, which sometimes form thick woods of miles in extent, the largest trees not much exceeding a foot in diameter.

The occurrence of sulphur upon the property was noticed by Prof. Silliman, and is worthy of especial attention. The material must become very important for the production of sulphuric acid, of which in refining petroleum an average quantity is consumed of about one gallon to twenty of refined oil. The acid is produced in this country and in Europe from crude sulphur brought from Sicily; but in consequence of its high price, recourse is now about being had in New York to the very inferior material for this purpose, the sulphuret of iron, or iron pyrites, found in connection with the iron ores. The reports of the Coast Survey also notice the occurrence of sulphur along the coast of Santa Barbara, and speak of it as sometimes yielding 60 per cent. of the pure material. It is believed that the sulphur found so abundantly upon this property will prove to be as rich, and measures should forthwith be taken for the establishment of a manufactory for the supply of acid to the oil refineries.

LABOR.

The Chinamen have emigrated in large numbers to this State, and in consequence of working at lower wages, encounter in the mining districts strong and often violent opposition. In undertaking a new enterprise upon a large scale in a region not already supplied with laborers, advantage may be taken of this, and the Chinamen, who are industrious and steady, can be introduced in any numbers, under their own overseers, as is the custom in employing them.

TRANSPORTATION TO THE COAST, AND SHIPMENT.

The crude oil may be advantageously refined near its sources in the valley. Some of these are within eight miles of the coast, and it is estimated by Mr. Sprague, the County Surveyor of Santa Barbara, that for an expenditure of $1,000, the Company may be furnished at once with a suitable road, over which the oil may be transported to the coast. The natural oil wells near the arroyo de Si-Saw and the Mupu river, on the eastern side of the property, are from 15 to 20 miles distant from the point of shipment; and for nearly the whole intervening distance the surface already affords a good natural road, suitable for the conveyance of the oil, until pipes are laid, a railroad is built, or some other mode of transit is determined on and adopted. Once upon the coast, the oil, if in barrels, may be stored ready for shipment, or if in bulk may be discharged into large tanks, constructed upon the shore for its reception—some of which should be for refined, and some for crude oil. From these tanks the oil may be conveyed to vessels at anchor in the offing. During a considerable part of the year there will be no serious difficulties in boating off cargoes of oil in barrels; for although there are no harbors along this part of the coast, a large trade in other heavy articles has for years been carried on in this way. The following extract from a letter of Nov., 1864, from Capt. James Alden, of the U. S. Navy, formerly chief officer of the hydrographic party of the U. S. Coast Survey, on that coast, in answer to certain queries propounded to him, in reference to this coast, presents very satisfactory information upon this point. He writes:

"There are no harbors on that coast at all, meaning, of course, the Santa Barbara channel. The weather, however, except in the winter months, is so fine that cargoes are shipped and landed through the surf with some trouble, but with all the necessary dispatch and safety. Even the winter months are not considered dangerous, for although some gales do occasionally blow from the south and east, vessels (sailing even), if they get under way in time, find a good lee under the islands which form the channel.

"I can therefore state with emphasis, that that shore is not difficult of approach, and that any quantity of the article you name can be shipped in barrels, with the utmost safety and dispatch."

Regular communication is maintained with San Francisco by stage and steamers; the latter employing thirty hours in the passage.

MARKET FOR REFINED OIL.

California and the American Pacific countries are now supplied with petroleum oils from the Atlantic States, and their consumption, in California alone, has amounted in the last two years to between

650,000 and 700,000 gallons per annum. Their use is rapidly increasing, while that of the other illuminating oils is diminishing. The mining regions expend large sums for light in their underground operations; and whenever petroleum is furnished cheaper than candles, it must supplant these, and its use be correspondingly extended. To the north of California—Oregon, Washington Territory, Nevada, British Columbia, &c., will require it in large quantities, and in the other direction it will not be long before the refined oils of Santa Barbara take the place of those which are now shipped from New York to Peru, Chili, and other countries on the Pacific. Australia, already consumes more than double as much as any other foreign country on the Pacific; and to this region we may look with confidence, as certain to require much larger supplies of oil, when these shall be furnished from the more convenient ports of California. Beside so extensive a market as the whole Pacific coast, it is believed that oil may be supplied to the European ports from Santa Barbara at less cost, than it can be sent from the oil districts in Pennsylvania; and it is supposed that it can be placed in New York City at a less price than from any other source.

MARKET FOR CRUDE OIL.

The sale of Crude Oil is soon likely to become important, not merely for the supply of refineries in other places, but among other purposes for use as a fuel, instead of coal, especially for steam vessels. In the oil refineries the liquid tarry residue of the stills is already now utilized in this way for maintaining the fires beneath them; pipes furnished with stop-cocks, letting it on to the fire in jets in such quantities as are required. The petroleum itself would be still better adapted for this application, and would go much further than an equal weight of solid fuel, if suitable apparatus was provided for supplying it under the steam boilers. The fires thus kept up would be far more manageable than those of coal, and involve no waste by unnecessary combustion.

It is expected, that so soon as petroleum can be cheaply introduced into San Francisco and the other cities of California, it will be applied to the manufacture of illuminating gas, which, owing to the enormous prices of the bituminous coals now used for this purpose, is afforded only at the most extraordinary rates. As long ago as 1860, the price of gas at San Francisco, was $8 00 per thousand cubic feet; at Marysville, $12 50; and at Stockton and Sacramento, $10 00. At the present time, bituminous coal being worth about $22 00 per ton in gold in San Francisco, the price in specie of gas is said to be $12 50.

Refined petroleum furnished from New York generally brings about the same price in gold which it sells for at the same time on the Atlantic, in currency. When afforded at the low rates at which it can be introduced from Santa Barbara, if not applied to the manufacture of gas, it must certainly materially reduce its consumption.

CONCLUSION.

The best plan for developing the property belonging to the Company will soon demand the careful attention of the shareholders. This may not be however, until they are possessed of details from the agent in charge. The property being nearly as large as the oil region of Pennsylvania, and, from the testimony of Prof. Silliman, vastly more productive in oil, will be found altogether too extensive to be improved under one organization alone; so that it may be expedient to form several subsidiary companies, and assign to each a portion of the territory, sufficient in each case for a business of the largest magnitude. The question also will arise whether, when refineries are established it may not be exedient to adopt the system of leasing wells, or the right to bore them, as is now customary in the Pennsylvania region. Some such scheme of combined industry must be adopted as soon as practicable, in order to utilize the vast quantities of oil product now running to waste, and increase it to the largest extent. When we consider what a number of petroleum Companies, organized on heavy capital, are prosperously operating in Pennsylvania, one can hardly venture to assign any limit to the business, that must almost immediately spring up from the development of the vast resources belonging to this Company.

The foregoing information in respect to the great petroleum district of Southern California is submitted to the public with the confident belief that the same impression will be made upon the reader that has induced the formation of a Company for its developement.

The promoters of the Company however earnestly desire that those who purchase the stock should thoroughly examine and weigh the testimony upon which this statement is based, and form their estimates irrespective of the names of those who are already interested in it.

REPORT

OF

Professor B. Silliman, Jr., upon the Outcrops of Mineral Oil, or Petroleum, which appear on the Ranch of Ojai,[*] near Buenaventura, in Santa Barbara County, California.

OF THE BUENAVENTURA DISTRICT.

About ten miles nearly north of the old town of Buenaventura, is a mountain ridge rising about 2,000 feet in height, and continuing for about thirteen miles. This mountain has the line of its crest running nearly east and west, and is bounded on the west by the valley of the Buenaventura and San Antonio Creeks, while to the east it is cut off by the Arroyo de Mupu. Several smaller streams, or dry cañadas, divide both slopes of this mountain into subordinate districts; but viewed as a whole, the entire range from east to west is one great fountain of mineral oil or naphtha, oozing through the outcrops in oil wells, which, losing the more volatile portion by evaporation, give origin to extensive deposits of asphaltum, or mineral pitch, through which at numerous points the oil still penetrates, and in the fervid sun of this region soon escapes by evaporation.

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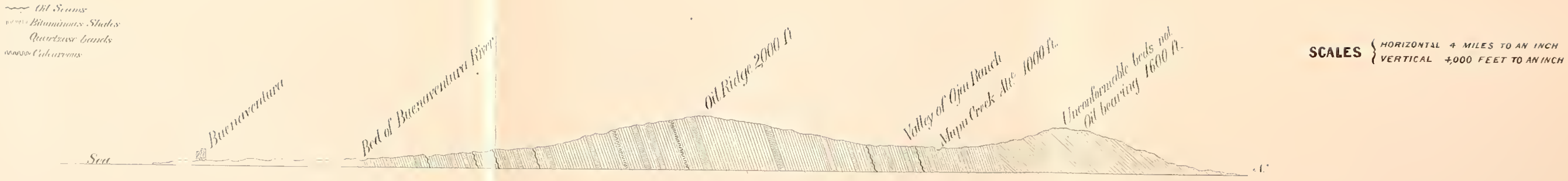
[*] Pronounced "O-hī."

GEOLOGICAL CHARACTER OF THIS OIL DISTRICT.

The Coast Range retires from the shore a few miles north of Buenaventura, and leaves an open plain next the sea, widening in the direction of Los Angeles County, and offering for agriculture some of the best savannah lands on the coast. The Oil Range forms the boundary of this plain on the left hand, or toward the north, its ridge, as already stated, bearing almost east and west. The eye of the observer is at once arrested by its regular stratification, the lines of its bedding appearing in the same horizontal plane across the furrows and intermediate valleys of the range. These beds are seen to dip at a high angle to the north, measuring from 70° to 80° (or 10° to 20° away from the vertical), preserving a remarkable uniformity throughout the entire range. The rocks forming the oil series are generally thin-bedded, easily split, and usually present on their upturned edges no index of their true nature, since the most highly bituminous shales are weathered white at the outcrop, while others are turned red by the oxidation of the iron, which exists in them as protoxyd or carbonate, weathering red or yellow, while others are yellowish from free sulphur, or the yellowish sulphate of iron and other saline substances; some of the heavier beds of sandstone are buff colored and form distinctly marked lines of a harder composition. The hammer soon reveals the real nature of the beds, the bituminous shales breaking black like coal shales, and shining with the lustrous varnish of asphalt. Thin beds of calcareous schists also exist, likewise bituminous and weathering whitish. No fossils were detected in any part of this range beyond a few obscure impressions of plants, without definite character, and yet seemingly reed-like. That the beds are cretaceous or tertiary, is pretty certain from evidence found in other parts of the Coast Range.



IDEAL SECTION FROM BUENAVENTURA TO MUPU ARROYO.

It appears from researches of others, that this zone or range of bituminous shales extends at intervals for a hundred and fifty miles south of this. I have traced it as far as the Cañada della Brea, in Los Angeles County, while it exists also at intervals to the north, as far as Glenroy, in Santa Clara County, or about 80 miles from San Francisco.

In most of these cases the outcrops are too distant from the sea for advantageous working; nor do the exudations of oil appear so encouraging at most other points as in the Buenaventura District. These facts are chiefly interesting as they serve to show the strength and persistence with which the rocks of this range were originally charged with the organic matter whose transformation has produced petroleum. It is to be observed in this connection, that the transformation of woody fibre into oil is a chemical change, taking place always out of contact with atmospheric air, and usually under water, but by no means necessarily connected with any particular geological period; as for example, of the Coal epoch, with which many intelligent people associate it. Thus in Canada, the oil appears in the older Silurian rocks—and it is even maintained by Prof. T. Sterry Hunt, that it is there due more to animal than to vegetable sources. In Pennsylvania, most of the oil is believed to flow from beds lower than the coal; while in Italy the Tertiary beds are its source, and such I understand is its age in the Indian wells of Rangoon. Its position here in beds, probably of the latter age, and certainly not more ancient than the Cretaceous, is therefore in perfect analogy with what is found elsewhere in the world.

SECTION OF THE BUENAVENTURA OIL DISTRICT.

The accompanying general section of the Buenaventura Oil District will show at a glance the relations of the strata bearing the oil, to the unconformable beds against which they abut on the North. The section is an ideal one, but will serve the purpose of conveying a general and sufficiently accurate idea of the structure of the range in which the oil appears. The elevation of the crest is not far from 2,000 feet, and the base line from the sea to a point vertically under the valley of the Ojai Ranch is about 20 miles. The elevation of the unconformable range beyond is some 300 to 500 feet less than that of the oil bearing beds. As respects the relative value of the two sides of the range for the outpouring of oil by artesian borings, it would seem that there could hardly be room for two opinions. While the facts show that, on the southerly side of the range there exist at present very encouraging and valuable outcrops, it is plain that the fountains from which these wells flow must always lie to the north, or in a direction where they are liable to be tapped by artesian borings sunk on the northerly slope of the mountain, or in the valley of the Ojai Ranch. The relations of the two sides of the range are perhaps better understood from an inspection of the accompanying section.

MAP OF THE OJAI RANCH, SHOWING ITS RELATIONS TO THE OIL BEARING RANGE AND TO THE OCEAN.

Accompanying this Report is a map,* prepared by Mr. Thomas Sprague, County Surveyor of Santa Barbara County, from official sources, showing the relations of the Ojai Ranch to the oil-bearing district, and to the sea ports on the south. This Ranch is an old Spanish grant, (number 340 of Beale's map of the State) embracing four leagues of land, or in round numbers, 18,000 acres. Its bounds are quite natural and unchangeable; the ridge of the oil range on the south, the sierra on the north, the arroyo de Si-saw and the valley of the Mupu Creek on the east, and of the Buenaventura River on the west. The general relation of this fine estate to the surrounding country is too clearly shown by the map to require any particular description in the text.

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* Not yet received in New York.

The streams on the Rancho Ojai are chiefly four in number; two flowing on the east and two on the west, as follows:

1st. The Lione—a branch of the San Antonio, rising at the Lion's Spring. It joins the San Antonio just above Gilbert's first factory, running into the Cañada de Lione.

2d. The San Antonio, a branch of the Buenaventura, rising three miles to the west of its junction with the Lione. This stream had an abundance of water in the month of July of this dry season.

3d. The Si-Saw, rising not far from the head of the Lione, but running easterly to the extreme east point of the mountain, where it joins the Mupu.

4th. The Mupu Creek, rising to the north-east of the high Sierras and skirting the east end of the Ranch, where it forms a boundary.

The second and fourth of these creeks are the larger streams. Besides these are numerous springs, some of which accompany the oil and petroleum.

Few Ranches are better watered than this, on which after two years of unequaled drought there still subsist large herds of cattle and flocks of sheep and goats.

THE PETROLEUM WELLS—OR NATURAL OUTCROPS OF ROCK OIL ON THE OJAI RANCH.

We will consider these in the order of the numbers by which they are designated on the map.

No. 1 is a well 30 feet in diameter, full of tarry oil, boiling with the escape of marsh gas. It is situated in the midst of a gentle slope, forming part of a terrace or plain, elevated at least 1000 feet above the sea. This plain, which is about one and a quarter miles long, by three-fourths of a mile wide, appears to have been formed by the long accumulation of asphaltum, from the evaporation of the overflow of this great oil spring. The depth of this great mass of asphaltum is, of course, a matter of conjecture, as no explorations have been made upon it; but it is probably safe to estimate its contents on a mile square at one yard in depth, which would give over three million cubic yards of fuel, from which a good coke is readily prepared, or which is even capable by distillation of yielding a large return of oil. Over this area there are several minor points of tarry outflow, but we consider the whole as one great oil spring. The present contents of the spring are foul with the decomposition of numerous cattle mired and drowned in the petroleum—an accident of frequent occurrence in dry seasons, when the half-famished and thirsty animals wander to browse, or drink the sulphurous water, along the margins of these dangerous places, and, when once involved, they never escape. It is for this reason difficult to form a fair judgment of the quality of the oil produced by this spring, while its very large evaporating surface offers to the fervid summer sun of this region a steady and rapid distillation of the light oil. I learn from Mr. Geo. S. Gilbert, who had a small refinery near by, on both the east and west ends of the oil range, that the petroleum of the great spring, now under consideration, gave a very large yield of oil, which, however, from the cause already alluded to, viz: dead cattle in the pool, had an offensive odor. The same person is my authority for the statement that the asphaltum in a very poor and ill-suited set of D retorts yielded 50 gallons of good oil to the ton.

2. This is a series with numerous openings in the face of the first table or terrace about 75 to 100 feet above the Si Saw and discharging into the valley of this stream. These openings plainly belong to one fissure or cropping at a considerably lower level than the great basin before described. Some thin oil is seen percolating from these outcrops.

3. Is an area of asphaltum three-fourths of a mile long by half a mile in width, exuding tar and rock oil at very numerous points, especially along the Arroyo. It is, in position a little above the great lagoon, No. 1.

4. Is a beautiful spring of oil and thin tar. This is a large and fine spring, showing more oil probably than either of the other outcrops.

5. This is a small well defined spring of thick oil.

The oil produced from these last two springs was found in Mr. Gilbert's experiments, as he assures me, of superior quality; he esteeming them as equal to any in the region for the value of their product.

6. Is a distinct group of several distinct outcrops of thin tar, north of the Lione branch of the San Antonio Creek.

These are all the outcrops of which I made note. The whole development is amazing, and it is plain to the least instructed persons, that the amount of oil capable of being produced here is almost without limit. Even without artesian wells, using the coke of the asphaltum as fuel, and the asphaltum itself as the raw material, a vast quantity of oil can be distilled; while the natural flow of the several springs, if concentrated simply by open cuts and ditches, and conducted to covered tanks, must produce a considerable daily supply. Compared to the original show on Oil Creek in Pennsylvania, the outcrops on the Rancho Ojai are truly surprising.

Although on the map, the outcrops are limited by six groups, numerically considered, they certainly exceed twenty places of discharge, and at least as many more where the oil has flowed in former times, but where now only solid moss-grown rocks of asphaltum attest its former activity.

TIMBER, WATER, AND CLIMATE, ON OJAI RANCH.

In respect of resources of fuel, aside from the asphaltum already named, the property is well wooded. This is especially true of a large tract of fine, arable land, at a level some 400 feet below the main outcrops of oil, to the north-west, where ample groves of white oak exist, mingled with other wood, fit for fuel.

The water has already been spoken of in describing the streams. The tract of land just mentioned is so situated as to be capable of easy and abundant irrigation, and is capable of growing wheat, or any other grain or crop whatever.

The Climate of the Ojai Ranch is completely unlike that of Buenaventura, where ocean fogs prevail to a great extent. On the ranch these are entirely cut off by the lofty crest of the Oil Ridge, giving a warm, secluded valley, well adapted to fruits and crops of all kinds.

OTHER RESOURCES OF THE ESTATE.

Aside from the agricultural advantages of this property, it possesses, in its strata, evidence of the presence of calcareous deposits, capable probably, of giving an ample supply of hydraulic cement, and if it should be thought best to resort to the system of distribution and delivery of the oil by conduits or pipes laid down to the sea, the cement pipes, which are best adapted to that use, can be supplied from the resources of the estate, in all reasonable probability. Clay is not wanting fit for the manufacture of bricks, and probably also for fire bricks—though of this we need farther experimental evidence.

Good building stone is available from the beds of the Sierra forming the northern boundary of the estate.

Sulphur is a product of these oil-bearing strata, and appears as a white or yellowish incrustation at numerous places, especially on the southerly outcrops.

PROBABLE PRODUCT OF THE DISTILLATION OF THIS OIL.

Under this head I beg leave to submit some few data, which are all at present available, drawn from the experience of Mr. Gilbert, (whose name has been already given) as an early pioneer in the development of this region. He states to me that in his experiments, the crude oil lost from 10 to 15 per cent. of its volume in the process of rectification. The following is his classification of the products:

Light Oil (Naphtha)............	5	per cent. at	65°
Burning Oil*.....................	50	"	30°--32°
Light Machine Oil...............	20	"	25°
Heavy Oil and Paraffine........	25	"	18°

I have had no opportunity to confirm this statement by my own trials, being here without a laboratory for the management of such researches.

CONCLUSION.

These are the chief facts of importance requisite to guide the judgment of persons familiar with the Oil business in all its details. I shall not therefore discuss plans for development of the business, of the boring of artesian wells--of the storage and transportation of the raw material, much less of its manufacture and rectification; points on which experience is the best authority.

Permit me, however, to add that, the coast of the Pacific at Buenaventura offers, as I am informed by Captain Greenman of the U. S. Coast Survey, no obstructions to the construction of proper docks for shipping. The best landing is however some miles south-west of Buenaventura, around the point beyond the outlet of the Santa Clara River, where vessels may ride at anchor safely in all conditions of wind, and where the landing is less rocky than above. This point is also nearer to the east end of Rancho Ojai than the landing at the Old Mission.

I do not submit for consideration any estimate of the probable value of any given number of artesian wells bored on the lines of the outcrops of the Ojai Ranch. The experience at Titusville is well known. Suffice it to say, that having made the first researches on the products of Oil Creek, long before any wells were bored there, I am of opinion that the promise of a remarkable development at Buenaventura is far better than it was in the Pennsylvania or Ohio regions—since so famous.

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* It will be observed, that Mr. Gilbert has set the density of his burning oil too low—an error due to his limited experience in the manufacture of oil.

B. Silliman, Jr.

Professor of General and Applied Chemistry in Yale College.

San Francisco, Cal.,
Sept. 1st, 1864.

APPENDIX.

It having been expressed to me, that it would be wise if some few calculations were added to the Report on the Coal Oil of Buenaventura, tending to show to persons not well informed on such subjects, the vast capabilities of the Estate of Ojai for profitable production, it gives me pleasure to present the accompanying memorandum.

Sept. 2d, 1864. B. Silliman, Jr.

ESTIMATE OF THE OIL IN ONE SQUARE MILE OF ASPHALTUM ONE YARD THICK.

In the description of the great spring, marked No. 1, on the map, it is stated that the deposit of asphaltum produced from the former overflow of this spring is probably one yard thick over one mile square, expressly stating, however, that the thickness (not the *area*) of the deposit is conjectural.

To show those not accustomed to contemplate the enormous products resulting from the combination of a few simple measurements, when applied to such large units as a square mile, let us observe, that in the 640 acres contained in a square mile, there are in one yard of depth, 3,400,000 cubic yards.

Granting that the density of asphaltum is only *one*, (Sp. Gr.—1), water being unity, (it is in fact 1.2 Sp. Gr., or thereabout), it appears that each cubic yard of this fossil fuel will weigh in round numbers 1,700 pounds; but 3,400,000 × 1,700 = 5-780,000,000 pounds, or 2,890,000 tons. If each ton yields 50 gallons of oil, the product of this large quantity of asphaltum turned into oil would be 144,500,000 gallons of oil, and an amount of coke which will correspond to at least one-third of the original weight of the asphaltum.

If an effort is made to estimate the money value of this product, calling the coke nothing, it will be found to reach a figure almost fabulous.

ESTIMATE OF THE QUANTITY AND VALUE OF OIL GIVEN OUT FROM A CERTAIN NUMBER OF ARTESIAN BORINGS.

The product of an artesian well, bored in an oil district is of course, always a matter of uncertainty ; but it is well known that in Pennsylvania and Ohio there are many wells which produce from one hundred to five hundred (and even more) barrels of oil daily.

Let us assume that you are successful in obtaining ten wells, flowing 100 barrels of forty gallons each, daily, then we find 1,000 barrels of forty gallons, equal 40,000 gallons crude oil. Crude oil at 40 cents, (present New York price,) $16,000, daily yield, or monthly, 30 days.. $480,000
and for 12 months............................ $5,460,000

Assuming the net saving on all the oil produced, is only 25 per cent. to the owners—packing, transportation, leakage, insurance, commissions, &c., consuming ¾th the gross value, there still remains a net profit, from 10 wells flowing 100 barrels daily, yearly of... $1,365,000

It is easy to see from these figures, that the result of the successful exploration of an oil-producing district is far beyond all ordinary calculations.

CONSIDERATIONS AFFECTING THE VALUE OF OIL PROPERTIES AS COMPARED WITH OTHER MINING ADVENTURES.

In all mining for metals there is unavoidably much capital put in peril before successful results are attained. Shafts must be sunk; adits, tunnels, and galleries be driven; hoisting, pumping, and other machinery constructed, and when all is done, the daily product is attained only as the fruit of a large amount of human labor of a costly description. It is only therefore the smallest number of all mining enterprises which succeed. In oil wells the prime cost of the property is usually small; the wells being bored at a cost of, say $1,000 to $5,000 each—there is virtually an end of expense. Nature supplies the power which gives free course to the flow of these perennial fountains—man has only to provide receiving vessels and transportation. Even the latter element of cost may in the present case be avoided, in a great degree, since pipes can be laid down from the reservoirs of storage to the sea at less cost than roads can be built; no winter frosts disturb the ground or congeal the product, and gravity replaces animal power.

Again, every mine of metals is a magazine of limited supply—you own so many feet, and this area contains so much and no more—every dollar's worth of ore mined and sent away leaves one dollar less in store. Not so with petroleum. It flows on year after year, and still the source of supply seems unimpaired; no conflicting claimants can arrest its flow, and like the widow's cruise, the daily modicum is never wanting.

The value of these considerations can be readily appreciated.

ON THE USE OF PETROLEUM AS FUEL.

Experiments have been made during the past year to demonstrate the value of petroleum as a substitute for coal in raising steam at sea. The U. S. Navy has caused trials to be made to prove its value, and I am assured, with encouraging results, but have not, owing to my absence during the past six months from my usual sources of information, seen the report in detail. I mention this subject, that it may be inquired into, since the use here indicated is one of the highest moment for the Pacific Coast, where good steam fuel for marine use is extremely scarce, and costly in proportion. Its use for the navigation of streams where there is no wood, and for even those desert situations where valuable mines lie dormant for want of fuel, may be of the highest moment. It is now possible to conceive that we may so modify roasting furnaces as to allow the use of petroleum in place of wood or coal, if its production on the Pacific coast should equal in abundance its present promise.

Many other considerations of a character calculated to affect the economical value of this great natural product might be named, but I will not enlarge.

THE

CALIFORNIA PETROLEUM CO.,

CAPITAL $10,000,000.

TO CONSIST OF 100,000 SHARES OF THE PAR VALUE OF $100.

This Company will be organized either under a special charter now granted, or under the laws of New York.

The property of the Company consists of the Ranch "Ojai," in Santa Barbara County, California, to which the title in fee simple is perfect, comprising a tract of four leagues, or between seventeen and eighteen thousand acres of land, and described in the accompanying statement and report of Prof. B. Silliman, Jr. The whole capital stock will be issued in payment for these lands but one million of dollars (ten thousand shares) will be exclusively appropriated for the development of the property. Of this amount, four thousand shares, of the par value of $100 in lawful money of the United States, full paid stock, and not liable to any further calls, are now offered for sale by subscription at twenty-five dollars per share, in anticipation of the organization, for the purpose of raising an immediate working capital.

The undersigned Committee will receive subscriptions for the same, and payment may be made to John E. Williams, Esq., Treasurer, *pro tem.*, at the Metropolitan Bank, who will issue receipts therefor.

New York, December, 1864.

AUGUSTUS C. RICHARDS, 44 Murray St., N. Y.
THOMAS A. SCOTT, Philadelphia.
P. W. TURNEY, 110 Broadway, N. Y.

Committee.